samples were collected 1986-1988 from different locations in the natural habitat and the 58 accessions were grown in 1988 in single plots to register phenological and yield data. Furthermore it was tried to enlarge genetic variation through mutation breeding by treating seeds with chemical mutagens as follows:

Ethyl methanesulfonate [EMS]		Sodium azide [NaN_3]	
0.4 %	3 hours	0.004M	2 hours
0.4 %	4 hours	0.006M	2 hours
1.0 %	6 hours	0.008M	3 hours

The M_1 generation was grown in the greenhouse in 1987, the M_2 in 1988 in the field. Oil content was measured with the nuclear magnetic resonance method (NMR), the vernolic acid content was determined by gas liquid chromatography of methyl esters prepared from the seed oil. The collected seed samples exhibited differences in yield but only a small variation in both oil and vernolic acid content, and in seed retention. From the mutagen-treated material some mutants were selected in desired direction, e.g. with four-seeded capsules, determinate growth and uniform ripening. The oil content and vernolic acid content of the mutants ranged from 43.5 to 49.3% (x=45.9%, s=1.3) and from 37.9 to 77.9% (x=66.8%, s=6.4), respectively.

(R. Vogel, G. Röbbelen, Institute of Agronomy and Plant Breeding, University of Göttingen, Von-Siebold-Strasse 8, D-3400 Göttingen, FRG)

Performance of winter-rapeseed lines with an improved fatty acid composition

High levels of linoleic (C18:2) and low content of linolenic acid (C18:3) are desired traits for rapeseed. Induced mutants with an improved fatty acid composition derived from the spring-rapeseed variety "Oro" were crossed with a winter-rapeseed line exhibiting an increased C18:2 content and backcrossed two times with several high yielding cultivars of winter-rapeseed. After each cross the F_2 was screened by gaschromatography for the mutant-type. After the second backcross from each of 118 lines (BC_2-F_3) an observation plot (9.4 m^2) was sown.

Results show that through backcrossing it was possible to develop lines with a high proportion of C18:2 and a reduced level of C18:3, whereas C18:1 remained unchanged, demonstrating new combinations different from the usual positive correlation between C18:2 and C18:3. Yield increased continuously with decreasing portion of the mutant genome. Relatively low genotype x location interaction for fatty acids was found.

(K. Kräling, Institute of Agronomy and Plant Breeding, University of Göttingen, Von-Siebold-Strasse 8, D-3400 Göttingen, FRG)

Results of breeding for modified C18-fatty acid composition in sunflower

In an earlier experiment, KUEBLER was able to select sunflower lines with modified fatty acid composition after induced mutagenesis. From this material, genotypes with more than 80% linoleic acid content could be selected, whereas the highest level of oleic acid obtained was 30% under field conditions and up to 50% in the phytotron. Recently, inbred lines with up to 90% oleic acid could be selected from a progeny of the Russian cultivar "Pervenets", which has high oleic acid content inherited by one major, partially dominant gene. The inheritance of oleic/linoleic acid content in our own material is not fully understood yet, but is highly heritable.

(L. Schmidt, R. Marquard, W. Friedt, Institute of Agronomy and Plant Breeding, Justus-Liebig-University, Ludwigstrasse 23, D-6300 Giessen, FRG)

Results of breeding for modified C18-fatty acid composition in *Linum*

The oil of cultivated linseed (*Linum usitatissimum*) is characterised by a high level (55-65%) of linolenic acid (C18:3) with comparatively little genetic variability. However, among wild *Linum* species there are large differences in fatty acid composition. Therefore, interspecific hybridisation between cultivated linseed and wild species may provide material segregating for oil quality. Alternatively, induced mutagenesis may be used for broadening genetic variation. Seeds of 32 *Linum* species were obtained from botanical gardens and institutes. Plant habitus, flower colour, oil content, fatty acid pattern, 1000-seed weight and seed colour were determined. Crosses between *Linum usitatissimum* cultivars and wild species were attempted. Where capsule development was not obtained, pollen tube growth was studied by fluorescence microscopy. It was tried to circumvent incompatibility barriers by applying the embryo rescue technique. For that purpose, "heart-shaped" immature embryos of *Linum usitatissimum* plants were cultured on MONNIER-medium. In a mutation breeding programme, M_5-lines with reduced C18:3-content (35-40%) derived from the cultivars "Bionda" and "Raulinus" by EMS-mutagenesis were intercrossed and the progeny analysed.

Variation in fatty acid composition amongst wild species was 3.5-68.2% for linolenic and 9.2-83.4% for linoleic acid. Variation of oil content was 22.5-46.0% and of 1000-seed weight 0.1-4.4g . Interspecific crosses of cultivated linseed with wild species of low linolenic and high linoleic acid content (especially *L. flavum*, *L. catharticum*, and *L. campanulatum*), were not successful because of pre-fertilisation barriers. Crosses between M_5-lines selected for reduced linolenic acid content (35-40%) were analysed for segregation in the F_2. Here, new recombinant types with only 11-13% linolenic, but nearly 50% oleic and 25-30% linoleic acid content could be identified. Previously, GREEN selected a mutant with very low C18:3-content (2%) which was controlled by two un-linked genes acting in an additive manner. This mutant shows a close negative correlation between linolenic and linoleic acid due to genetic block of oleic and linoleic de-saturation. A genetic block of de-saturation of oleic to linoleic acid seems to be also present in our mutant.

(M. Nickel, K. Nichterlein, W. Friedt, Institute of Agronomy and Plant Breeding, Justus-Liebig-University, Ludwigstrasse 23, D-6300 Giessen, FRG)

Effect of different intervals of x-ray split doses on shoot production of in vitro derived explants of *Gerbera jamesonii* Bolus

Linearity between rising x-ray doses and mutation rate is limited by the simultaneously increasing radiation damage: induced chromosome aberrations eliminate valuable factor mutations. The application of fractionated doses provides the opportunity for repair of a distinct portion of damage. The dose of 30 Gy was fractionated into two identical parts. The periods for repair were 0.5 to 48 hs. The absolute and cumulative number of post-irradiation regenerated axillary shoots on 4 subsequent dates of cutoff were used as parameters to estimate radiosensitivity. From an economical point of view the interval of 4 hs between two dose fractions may be recommended for practice.

(F. Walther, A. Sauer, Federal Research Centre for Horticultural Plant Breeding, D-2070 Ahrensburg, Federal Republic of Germany)